CLAIMS

1. Amorphous hard carbon film mainly comprising carbon and hydrogen, characterized by containing metal oxide in said film.

2. Amorphous hard carbon film according to claim 1, wherein said metal oxide is an oxide of at least one element selected from the group consisting of Si, Ti, B and W.

3. Amorphous hard carbon film according to claim 1, wherein the content of oxygen in said film is from approximately 0.1 to 10 atomic %.

4. Mechanical part (10, 12, 30, 42) having a sliding portion, characterized in that the sliding portion is coated with an amorphous hard carbon film (12) mainly comprising carbon and hydrogen and metal oxide.

5. Mechanical part according to claim 4, wherein said metal oxide is an oxide of at least one element selected from the group consisting of Si, Ti, B and W.

6. Mechanical part according to claim 4 or 5, wherein said amorphous hard carbon film (12) has hardness of from Vickers 1800 to 2500.

7. Mechanical part according to claim 4 or 5, wherein said amorphous hard carbon film (12) is from 2 to 15 μ m thick.

8. Mechanical part according to any one of claims 4 through 7, wherein the mechanical part is a piston ring (42).

9. Mechanical part according to any one of claims 4 through 7, wherein said mechanical part is a vane (20) of a compressor.

10. Mechanical part according to any one of claims 1 through 4, wherein the mechanical part is a plunger (30) of a fuel-injecting pump.

11. A method for forming an amorphous hard carbon film, characterized in that carbon material, metal-containing material and oxygen are introduced into a vacuum chamber (1, 41) where a substrate (10) is placed, thereby forming an amorphous hard carbon film, in which metal oxide is contained.

12. A method for forming an amorphous hard carbon film, characterized in that carbon material, metal-containing material and oxygen-containing material are introduced into a vacuum chamber (1, 41) where a substrate (10) is placed, thereby forming an amorphous hard carbon film, in which metal oxide is contained.